

### REMARKS

Applicant requests reconsideration of the application in view of the discussion that follows. The status of the claims as of this response is as follows: Claims 1-18 are pending and claims 19-31 have been withdrawn. Applicant reserves the right to file divisional applications to the separately patentable subject matter thereof. Withdrawn claims 19 and 26 were previously amended to make them depend from apparatus claims thereby preserving Applicant's ability for rejoinder of these claims in accordance with the provisions of MPEP §821.04. No claims were amended herein.

Applicant acknowledges the indication in the Office Action that previous rejections under 35 U.S.C. 102(b) and 103(a), which were not reiterated in the present Office Action, were withdrawn in view of the previous amendments. New grounds of rejection are discussed below.

#### Rejection under 35 U.S.C. §103

Claims 1, 3, 5, 7-11, 15, 17 and 18 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mirkin, *et al.* (U.S. Patent Application Publication No. 2002/0127574 A1) (Mirkin) in view of Rupchock, *et al.* (U.S. Patent No. 4,376,828) (Rupchock) as evidenced by Hunt, *et al.* (U.S. Patent No. 6,329,899 B1) (Hunt).

The Office Action asserts, with regard to claim 1, that Mirkin teaches a device comprising a first electrode on a substrate and a pad of resistive material disposed on the substrate adjacent the first electrode and between the first electrode and a second electrode disposed adjacent the pad. In support of this assertion, the Office Action identifies a TLC plate with a layer of silica in Mirkin as the substrate having a pad of resistive material disposed thereon as presently claimed. The Office Action contends that the silica is the resistive pad since Hunt defines silica as resistive. The Office Action further asserts that Mirkin discloses a pair of electrodes located on the substrate and a probe supported on the pad. In support of this assertion, the Office Action refers to oligonucleotides that are attached to the substrate between the electrodes in Mirkin wherein the substrate is a TLC plate having a resistive silica layer.

The Office Action recognizes that Mirkin does not teach glass silica TLC plates. However, contends the Office Action, Rupchock teaches the use of glass silica TLC plates with the added advantage that the glass silica TLC plates allow

wide variance in the amount and particle size of the silica as well as allowing a diverse amount of other materials on the plate. It would, therefore, have been obvious to a person of ordinary skill in the art at the time the invention was claimed, concludes the Office Action, to have modified the method of Mirkin to use glass silica TLC plates as taught by Rupchock with reasonable expectation of success.

Applicant respectfully traverses this rejection. First, Hunt defines silica as a dielectric, which is a non-conductor of direct electric current or electricity. See, for example, Webster's Ninth New Collegiate Dictionary, Merriam-Webster Inc, Springfield, MA (1983); Hackh's Chemical Dictionary, McGraw-Hill, Inc., Fourth Edition (1972) (copies included for convenience). Therefore, the silica of the silica TLC plates of Mirkin is not a pad of resistive material as recited in claim 1. The silica TLC plates of Mirkin as modified by Rupchock to be glass silica TLC plates as asserted in the Office Action represent only a substrate and lack the required pad of resistive material as presently claimed. Furthermore, Applicant's specification identifies silicon dioxide as a non-conductive material that may be employed for the substrate such as in the form of a thin film (page 16, lines 16-19).

Applicant submits that Mirkin is also deficient in failing to teach at least the following elements of claim 1. In paragraph 0050, for example, Mirkin teaches that the oligonucleotides are attached to the substrate. This is recognized in the Office Action. Mirkin further teaches (paragraph 0133) that any substrate can be used that allows observation of a detectable change and that suitable substrates include transparent solid surfaces such as glass, quartz, plastics and other polymers. In paragraph 0157 Mirkin teaches that attachment of the oligonucleotides to a glass substrate can be accomplished by condensing the oligonucleotides through phosphoryl or carboxylic acid groups to aminoalkyl groups on the substrate surface. Therefore, Mirkin, who teaches attachment to the glass surface, does not teach the claim 1 limitation that the oligonucleotides are supported on the pad of resistive material.

Even if one were to argue that the oligonucleotides are attached to the silica of a glass TLC plate, the teaching of Mirkin would still be deficient because the reference fails to disclose or suggest the element of claim 1 that recites a first electrode on a substrate. For example, although Fig. 41 of Mirkin shows electrodes on the substrate, the substrate is a glass substrate without silica; the oligonucleotides are on the substrate not on a resistive pad. When a silica TLC plate

is utilized, the electrodes are on the silica and not on the substrate. There is no teaching in Mirkin of removing a portion of silica to place electrodes on a glass plate and have oligonucleotides attached to the remaining portion of the silica. Nor would such an approach be obvious to one of ordinary skill in the art because, to remove a portion of the silica before placing the electrodes on the glass TLC plate would require additional steps and there is no indication in the reference as to any reason to remove a portion of the silica. Furthermore, as discussed above, the silica of Mirkin is not a pad of resistive material as claimed.

With regard to claim 3, since there is no pad of resistive material in Mirkin, then the first electrode, the second electrode and the pad of resistive material are not supported on the substrate. Furthermore, as discussed above, for a glass silica TLC plate of the combined Mirkin-Rupchock teachings, there is no teaching that a portion of the silica is removed to allow the first and/or the second electrodes to be supported on the glass substrate.

Claim 5 is patentable over the combined teachings of the references for reasons similar to those discussed above with regard to the rejection of claims 1 and 3.

The Office Action acknowledges that the substrate is the glass of a glass TLC plate, which the Office Action recognizes as a non-conductive layer. As indicated in, for example, Hackh's Chemical Dictionary and Webster's Ninth New Collegiate Dictionary, a primary component of glass is silicon dioxide. Accordingly, claim 7 is patentable over a combination of the teachings of the references because the combination of teachings fails to disclose or suggest a pad of resistive material on a non-conductive substrate.

Claims 8-11, 15, 17 and 18 are patentable over the combined teachings of the references for reasons similar to those discussed above with regard to the rejection of claims 1, 3 and 7, for example.

Claims 1, 2, 10, and 13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mirkin and Rupchock in view of Eggers, *et al.* (U.S. Patent No. 5,532,128) (Eggers), and as evidenced by Hunt.

The Office Action reiterates the same assertions with regard to the Mirkin, Rupchock and Hunt references as in the rejection of claim 1 above. However, the Office Action recognizes that the combination of teachings of the above references does not teach the element of claim 2 wherein at least some of the probe is

supported on at least one of the first electrode and the second electrode. The Office Action contends that Eggers teaches a device comprising a first electrode and a pad of resistive material and a second electrode wherein at least some of a probe is supported on one of the electrodes. Therefore, concludes the Office Action, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have modified the devices and microarrays comprising electrodes and resistive pads as taught by Mirkin and Rupchock with the support of the probes on the electrodes as taught by Eggers with a reasonable expectation of success.

Without acquiescing in the assertions in the Office Action, Applicant submits that the combination of teachings of Mirkin, Rupchock and Hunt is deficient in not teaching all of the elements of claim 1 as demonstrated above with regard to the rejection of claim 1 over the above references. Eggers does not cure the above-identified deficiencies of the combination of the above references. The Eggers reference does not disclose or suggest a pad of resistive material on the substrate between the first and second electrodes. In Eggers, the metal linker layer, which the Office Action identifies as a pad of resistive material, is not on a substrate as recited in the present claim. Rather, in Eggers the metal linker layer is on electrode plates 24 a, 24b. Furthermore, the metal layer, which the Office Action identifies as the pad of resistive material, does not lie between the first electrode and the second electrode as recited in claim 1.

The Office Action argues that Eggers teaches a probe supported on at least one of the first electrode and the second electrode (referring to col. 4, lines 45-46, and Figure 2a). However, the Office Action asserts that the metal linker layer is the resistive layer referring to Figs. 2a and 2b and col. 8, lines 38-42. As can be seen, the metal linker layer referred to in Eggers is 24a, which the reference identifies as an electrode. Thus, the metal linker layer cannot also be the pad of resistive material. Therefore, there is no disclosure or suggestion in Eggers of a pad of resistive material on the substrate of Eggers.

Claim 13 is patentable over the combined teachings of the references for reasons similar to those discussed above with regard to the rejection of claims 1-3 and 7. In any event, claim 13 depends from claim 10 and ultimately from claim 1 and is, therefore, patentable over the combination of the teachings of the above references by virtue of such dependency. As explained above, Eggers does not cure the deficiencies of Mirkin, Rupchock and Hunt.

Claims 1, 4, 10, and 14 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mirkin and Rupchock in view of Mansky, *et al.* (U.S. Patent Application Publication No. 2002/0032531 A1) (Mansky) and as evidenced by Hunt.

The Office Action reiterates the same assertions with regard to the Mirkin, Rupchock and Hunt references as in the rejection of claim 1 above. However, the Office Action recognizes that the combination of teachings of the above references does not teach the element of claims 4 and 14 wherein a gap is defined between the pad of resistive material and at least one of the first electrode and the second electrode. However, contends the Office Action, Mansky teaches a sensor-based array having a plurality of pads and a plurality of pairs of electrodes adjacent each pad wherein there is a gap between each pair of electrodes and the pads with the added advantage that the gap prevents the electrodes (i.e., the contact pads of the reference) from being contaminated with the test materials. Therefore, concludes the Office Action, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have modified the devices and microarrays comprising electrodes and resistive pads as taught by Mirkin and Rupchock with the gaps as taught by Mansky with a reasonable expectation of success.

Without acquiescing in the arguments advanced in the Office Action, claims 4 and 14 are patentable over the combination of Mirkin, Rupchock, Hunt and Mansky at least in view of their respective dependency ultimately from claim 1, which, as demonstrated above, is patentable over Mirkin, Rupchock and Hunt. The deficiencies of Mirkin, Rupchock and Hunt are enumerated above and Mansky does not cure those deficiencies because Mansky does not provide the teaching that is absent in the combination of Mirkin, Rupchock and Hunt. Accordingly, the combined teachings of Eggers and Mansky do not suggest the subject matter of claims 4 and 14.

Claims 1, 6, 10, and 16 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mirkin and Rupchock in view of Choong, *et al.* (U.S. Patent No. 6,238,909 B1) (Choong) and as evidenced by Hunt.

The Office Action reiterates the same assertions with regard to the Mirkin, Rupchock and Hunt references as in the rejection of claim 1 above. However, the Office Action recognizes that the combination of teachings of the above references does not teach the element of claims 6 and 16 regarding fissures such that the pad is segmented into a plurality of segments. However, contends the Office Action,



Choong teaches devices having a pair of electrodes and further comprising a pad of porous media that is segmented into a plurality of segments (referring to the structures numbered "20" in Figure 1; column 2, lines 54-61, of Choong), wherein the porous media comprises silica with the added advantage the segments prohibit unwanted reactions between the electrodes and the sample. The Office Action concludes that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have modified the devices and microarrays comprising electrodes and resistive pads as taught by Mirkin and Rupchock with the segmented pad as taught by Choong with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification, asserts the Office Action, because the modification would have resulted in prohibiting unwanted reactions between the electrodes and the sample as explicitly taught by Choong.

Without acquiescing in the arguments advanced in the Office Action, claims 6 and 16 are patentable over the combination of Mirkin, Rupchock, Hunt and Choong at least in view of their respective dependency ultimately from claim 1, which, as demonstrated above, is patentable over Mirkin, Rupchock and Hunt. The deficiencies of Mirkin, Rupchock and Hunt are enumerated above and Choong does not cure those deficiencies. Accordingly, the combined teachings of Mirkin, Rupchock, Hunt and Cass do not suggest the subject matter of claims 6 and 16. Furthermore, as is clearly evident in Fig. 1 of Choong, the electrodes 30 are not on a substrate as in the presently claimed devices and microarrays. Thus, Choong does not overcome the deficiency of Mirkin, Rupchock and Hunt in this regard.

Claims 1, 10, and 12 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mirkin and Rupchock in view of Cass, *et al.* (U.S. Patent No. 6,312,906 B1) (Cass) and as evidenced by Hunt.

The Office Action reiterates the same assertions with regard to the Mirkin, Rupchock and Hunt references as in the rejection of claim 1 above. However, the Office Action recognizes that the combination of teachings of the above references does not teach the element of claim 12 regarding a microarray that comprises at least one reference device. However, contends the Office Action, Cass teaches nucleic acid probes, immobilization to solid phases, and electrodes and further comprising a reference device (referring in the reference to a site having a probe immobilized thereon that hybridizes to a reference nucleic acid; column 11, line 65-column 12, line 5) with the added advantage that the reference device provides an

internal real-time control to monitor the device surface and correct for device deterioration. It would therefore have been obvious, asserts the Office Action, to a person of ordinary skill in the art at the time the invention was made to have modified the devices and microarrays comprising electrodes and resistive pads as taught by Mirkin and Rupchock with the reference device, i.e., a site having a probe for a reference nucleic acid, as taught by Cass (the Office Action referred to Mansky, *et al.*; however, Applicant believe that this was a typographical error and that Cass, *et al.*, was intended) with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification, asserts the Office Action, because the modification would have resulted in providing an internal real-time control to monitor the device surface and correct for device deterioration as explicitly taught by Cass.

Without acquiescing in the arguments advanced in the Office Action, claim 12 is patentable over the combination of Mirkin, Rupchock, Hunt and Cass at least in view of its dependency ultimately from claim 1, which, as demonstrated above, is patentable over Mirkin, Rupchock and Hunt. The deficiencies of Mirkin, Rupchock and Hunt are enumerated above and Cass does not cure those deficiencies. Accordingly, the combined teachings of Mirkin, Rupchock, Hunt and Cass do not suggest the subject matter of claim 12.

### Conclusion

Claims 1-18 satisfy the requirements of 35 U.S.C. §103. Allowance of the above-identified patent application, it is submitted, is in order.

Respectfully submitted,



Theodore J. Leitereg  
Attorney for Applicant  
Reg. No. 28,319

Agilent Technologies, Inc.  
Legal Department, M/S DL429  
Intellectual Property Administration  
P.O. Box 7599  
Loveland, CO 80537-0599



WEBSTER'S

Ninth New  
Collegiate  
Dictionary

*A Merriam-Webster®*

BEST COPY AVAILABLE



**dick** \dɪk\ *n* [*Dick*, nickname for *Richard*] (1553) 1 chiefly *Brit*: *FELLOW*. *CHAP* 2: *PENIS* — usu. considered vulgar 3 [by shortening & alter.]: *DETECTIVE*

**dick-cissel** \dɪk-'sɪs-əl, 'dɪk-,əl\ *n* [imit.] (ca. 1886): a common migratory black-throated finch (*Spiza americana*) of the central U.S.

**dick-ens** \dɪk-ənz\ *n* [euphemism] (1598): *DEVIL*, *DEUCE*

**dick-er** \dɪk-ər\ *n* [ME *dyker*, fr. L *decuria* quantity of ten, fr. *decem* ten — more at *TEN*] (13c): the number or quantity of 10 esp. of hides or skins

**dicker** *vi* *dick-ered*; *dick-er-ing* \dɪk-(ə-)rɪŋ\ [origin unknown] (1802): *BARGAIN*

**dicker** *n* (1823) 1: *BARTER* 2: an act or session of haggling or bargaining

**dick-ey** or **dicky** also **dick-ie** \dɪk-ē\ *n*, *pl* *dickeys* or *dick-ies* [*Dicky*, nickname for *Richard*] (1753) 1: any of various articles of clothing: as *a*: a man's separate or detachable shirtfront *b*: a small fabric insert worn to fill in the neckline 2 chiefly *Brit*: *a*: the driver's seat in a carriage *b*: a seat at the back of a carriage or automobile 3: a small bird

**Dick test** \dɪk-əl\ *n* [George F. *Dick* and Gladys H. *Dick*] (ca. 1925): a test to determine susceptibility or immunity to scarlet fever by an injection of scarlet fever toxin

**di-clin-nous** \('dɪ-'kli-nəs\ *adj* (1830): having the stamens and pistils in separate flowers

**di-cot** \dɪ-'kɑt\ *n* (1830): *DICOTYLEDON*

**di-cot-y-le-don** \dɪ-'kɑt-'lɪ-'ed-'n\ *n* [NL] (1877): a plant with two seed leaves: a member of the one (Dicotyledones) of the two subclasses of angiospermous plants that comprises those with two cotyledons — *di-cot-y-le-don-ous* \-'n-əs\ *adj*

**di-cou-ma-rin** \('dɪ-'kju-mə-rən\ *n* (ca. 1727): *DICUMAROL*

**di-crot-ic** \dɪ-'krɑt-ɪk\ *adj* [Gk *dikrotos*, fr. *di-* + *krotos* rattling noise, beat, fr. *krotein* to beat; akin to OE *hrindan* to push] (ca. 1811) 1: of the pulse: having a double beat 2: being or relating to the second part of the arterial pulse occurring during diastole of the heart or of an arterial pressure recording made during the same period — *di-cro-tism* \dɪ-'krɑ-'tɪz-əm\ *n*

**Di-cra-phone** \dɪ-'krɑ-'fōn\ *trademark* — used for a dictating machine

**dic-tate** \dɪk-'tāt, dɪk-'\ *vb* *dic-tat-ed*; *dic-tat-ing* [L *dictatus*, pp. of *dictare* to assert, dictate, fr. *dictus*, pp. of *dicere* to say — more at *DIC-TION*] *vi* (1592) 1: to give dictation 2: to speak or act domineeringly: *PRESCRIBE* ~ *vi* 1: to speak or read for a person to transcribe or for a machine to record 2 *a*: to issue as an order *b*: to impose, pronounce, or specify authoritatively

**dic-tate** \dɪk-'tāt\ *n* (1594) 1 *a*: an authoritative rule, prescription, or injunction *b*: a ruling principle (according to the ~s of his conscience) 2: a command by one in authority

**dictating machine** *n* (1939): a machine used esp. for the recording of human speech for transcription

**dic-ta-tion** \dɪk-'tā-shən\ *n* (1656) 1 *a*: *PRESCRIPTION* *b*: arbitrary command 2 *a* (1): the act or manner of uttering words to be transcribed (2): material that is dictated or transcribed *b* (1): the performing of music to be reproduced by a student (2): music so reproduced

**dic-ta-tor** \dɪk-'tāt-ər, dɪk-'\ *n* [L, fr. *dictatus*] (14c) 1 *a*: a person granted absolute emergency power; esp: one appointed by the senate of ancient Rome *b*: one holding complete autocratic control *c*: one ruling absolutely and often oppressively 2: one that dictates

**dic-ta-to-ri-al** \dɪk-'tā-'tɔr-ē-əl, -'tɔr-əl\ *adj* (1701) 1 *a*: of, relating to, or befitting a dictator (~ power) *b*: ruled by a dictator 2: oppressive to or contemptuously overbearing toward others: arrogantly domineering — *dic-ta-to-ri-al-ly* \-'ē-əl\ *adv* — *dic-ta-to-ri-al-ness* *n*

*syn* *DICTATORIAL*, *MAGISTERIAL*, *DOGMATIC*, *DOCTRINAIRE*, *ORACULAR* mean imposing one's will or opinions on others. *DICTATORIAL* stresses autocratic, high-handed methods and a domineering manner; *MAGISTERIAL* stresses assumption or use of prerogatives appropriate to a magistrate or schoolmaster in forcing acceptance of one's opinions; *DOGMATIC* implies being unduly and offensively positive in laying down principles and expressing opinions; *DOCTRINAIRE* implies a disposition to follow abstract theories in framing laws or policies affecting people; *ORACULAR* implies the manner of one who delivers opinions in cryptic phrases or with pompous dogmatism.

**dic-ta-tor-ship** \dɪk-'tāt-ər-'ʃɪp, dɪk-,əl\ *n* (1542) 1: the office of dictator 2: autocratic rule, control, or leadership 3 *a*: a form of government in which absolute power is concentrated in a dictator or a small clique *b*: a government organization or group in which absolute power is so concentrated *c*: a despotic state

**dic-tion** \dɪk-'ʃən\ *n* [L *dictio*-, *dictio* speaking, style, fr. *dictus*, pp. of *dicere* to say; akin to OE *tēon* to accuse, L *dicare* to proclaim, dedicate, Gk *deiknynai* to show, *dikē* judgment, right] (1581) 1 *obs*: verbal description 2: choice of words esp. with regard to correctness, clearness, or effectiveness 3 *a*: vocal expression: *ENUNCIATION* *b*: pronunciation and enunciation of words in singing — *dic-tion-al* \-'ʃnəl, -'ʃən-'l\ *adj* — *dic-tion-al-ly* \-'ē\ *adv*

**dic-tio-nary** \dɪk-'ʃə-'ner-ē\ *n*, *pl* *-nar-ies* [ML *dictionarium*, fr. LL *dictio*-, *dictio* word, fr. L, speaking] (1526) 1: a reference book containing words usu. alphabetically arranged along with information about their forms, pronunciations, functions, etymologies, meanings, and syntactical and idiomatic uses 2: a reference book listing alphabetically terms or names important to a particular subject or activity along with discussion of their meanings and applications 3: a reference book giving for words of one language equivalents in another 4: a list (as of phrases, synonyms, or hyphenation instructions) stored in machine-readable form (as on a disk) for reference by an automatic system (as for information retrieval or computerized typesetting)

**dic-tum** \dɪk-'təm\ *n*, *pl* *dic-ta* \-'tə\ also *dictums* [L, fr. neut. of *dictus*] (ca. 1706) 1: a formal authoritative pronouncement of a principle, proposition, or opinion 2: a judicial opinion on a point other than the precise issue involved in determining a case

**dicty-** or **dictyo-** *comb form* [NL, fr. Gk *dikty-*, *diktyo-*, fr. *diktyon*, fr. *dikein* to throw]: net (<*dictyostele*> (<*dictyosome*>)

**dic-tyo-some** \dɪk-'tē-'səm\ *n* (ca. 1930): *GOLGI BODY*

**dic-tyo-stele** \dɪk-'tē-'stēl, dɪk-'tē-'stē-lē\ *n* (ca. 1902): a stele in which the vascular cylinder is broken up into a longitudinal series or network of vascular strands around a central pith (as in many ferns)

**di-cu-ma-rol** also **di-cou-ma-rol** \dɪ-'k(y)ü-mə-'röl, -'röl\ *n* [*di-* + *couma-rin* + *-ol*] (1943): a crystalline compound  $C_{15}H_{12}O_6$  orig. obtained from spoiled sweet clover hay and used to delay clotting of blood esp. in preventing and treating thromboembolic disease

**di-cy-clic** \('dɪ-'sɪ-klik, -'sɪk-'lik\ *adj* (ca. 1899): *BICYCLIC* 2

**did** *past of DO*

**di-dact** \dɪ-'dakt\ *n* [back-formation fr. *didactic*] (1954): a didactic person

**di-dac-tic** \dɪ-'dak-'tik, də-\ *adj* [Gk *didaktikos*, fr. *didaskein* to teach] (1658) 1 *a*: designed or intended to teach *b*: intended to convey instruction and information as well as pleasure and entertainment 2: making moral observations — *di-dac-ti-cal* \-'ti-kəl\ *adj* — *di-dac-ti-cal-ly* \-'ti-k(ə)-lē\ *adv* — *di-dac-ti-cism* \-'tɪ-'sɪz-əm\ *n*

**di-dac-tics** \-'tiks\ *n* *pl* but *sing* or *pl* in *constr* (ca. 1846): systematic instruction: *PEDAGOGY*, *TEACHINGS*

**di-dap-per** \dɪ-'dap-ər\ *n* [ME *dydoppar*, prob. alter. of OE *dūfedoppa* pelican, fr. *dūfan* to dive + *-doppa* (akin to OE *dyppan* to dip) dipper — more at *DIVE*, *DIP*] (14c): a small grebe (as a dabchick)

**did-dle** \dɪd-'lɪ\ *vb* *did-dled*; *did-dling* \dɪd-'lɪŋ\ [origin unknown] *vi* (1786): *DAWDLE*, *FOOL* ~ *vi* 1 chiefly *dial*: to move with short rapid motions 2: to waste (as time) in trifling 3: *HOAX*, *SWINDLE* — *did-dler* \dɪd-'lɪ-ər, -'lɪ-ər\ *n*

**did-ger-i-doo** \dɪj-'ə-rē-'dū, dɪj-'ə-rē-\ *n* [origin unknown] (1924): a large bamboo or wooden trumpet of the Australian aborigines

**didn't** \dɪd-'nt, -'n, *dial* also \dɪt-'n(t) or ('dɪnt)\ *did not*

**di-do** \dɪd-(ə)\ *n*, *pl* *didoes* or *didos* [origin unknown] (1807) 1: a mischievous or capricious act: *PRANK*, *ANTIC* — often used in the phrase *cut didoes* 2: something that is frivolous or showy

**Di-do** \dɪd-(ə)\ *n* [L, fr. Gk *Didō*]: a legendary queen of Carthage in Vergil's *Aeneid* who kills herself when Aeneas leaves her

**didst** \('dɪdɪst\ *archaic past 2d sing of DO*

**di-dym-i-um** \dɪ-'dɪm-'ē-əm\ *n* [NL, fr. Gk *didymos* double, twin, testicle, fr. *dyo* two — more at *TWO*] (1842): a mixture of rare-earth elements made up chiefly of neodymium and praseodymium and used esp. for coloring glass for optical filters

**di-dyn-a-mous** \('dɪ-'dɪn-'ə-məs\ *adj* [deriv. of Gk *di-* + *dynamis* power — more at *DYNAMIC*] (1794): having four stamens disposed in pairs of unequal length (snapdragons are ~)

**die** \dɪ\ *vi* *died*; *dy-ing* \dɪ-'ɪŋ\ [ME *dien*, fr. or akin to ON *deyja* to die; akin to OHG *touwen* to die, OIr *duine* human being] (12c) 1: to pass from physical life: *EXPIRE* 2: to pass out of existence: *CEASE* (their anger *died* at these words) 3 *a*: to suffer or face the pains of death *b*: *SINK*, *LANGUISH* (dying from fatigue) *c*: to long keenly or desperately (dying to go) 4 *a*: to pass into an inferior state or situation (they have developed competence which we... must utilize lest it wither and ~ — Ruth G. Strickland) *b*: *STOP* (the motor *died*) 5: to cease to be subject: become indifferent (~ to worldly things) — *die hard* 1: to be long in dying (such rumors *die hard*) 2: to continue resistance against hopeless odds (hard-shell conservatism *dies hard*)

**die** \dɪ\ *n*, *pl* *dice* \dɪs\ or *dies* \dɪz\ [ME *dee*, fr. MF *dē*] (14c) 1 *pl* *dice*: a small cube marked on each face with from one to six spots and used usu. in pairs in various games and in gambling by being shaken and thrown to come to rest at random on a flat surface 2 *pl* *usu dice*: something determined by or as if by a cast of dice: *CHANCE* 3 *pl* *dies*: *DADO* 4 *pl* *dies*: any of various tools or devices for imparting a desired shape, form, or finish to a material or for impressing an object or material: as *a* (1): the larger of a pair of cutting or shaping tools that when moved toward each other produce a desired form in or impress a desired device on an object by pressure or by a blow (2): a device composed of a pair of such tools *b*: a hollow internally threaded screw-cutting tool used for forming screw threads *c*: a cutter to cut out blanks *d*: a mold into which molten metal or other material is forced *e*: a perforated block through which metal or plastic is drawn or extruded for shaping

**die** *vi* *died*; *die-ing* (1703): to cut or shape with a die

**die-back** \dɪ-'bak\ *n* (ca. 1886): a condition in woody plants in which peripheral parts are killed esp. by parasites

**die-cious** *var of* *DIOECIOUS*

**die down** *vi* (1834): *DIMINISH*, *SUBSIDE* (the storm *died down*)

**die-hard** \dɪ-'hɑrd\ *n* (1912): an irreconcilable opponent of change (party ~s who allow no concession of any kind)

**die-hard** \dɪ-'hɑrd\ *adj* (1871): strongly resisting change: completely and determinedly fixed (a ~ conservative) — *die-hard-ism* \-'ɪz-əm\ *n*

**di-el** \dɪ-'əl, -'el\ *adj* [irreg. fr. L *dies* day + E *-al*] (ca. 1935): involving a 24-hour period that usu. includes a day and the adjoining night (~ fluctuations in temperature)

**di-el-drin** \dɪ-'dɛ(ə)l-'drən\ *n* [*Diels-Alder* reaction (an addition reaction forming a 6-membered ring), after Otto *Diels* & Kurt *Alder*] (ca. 1949): a white crystalline persistent chlorinated hydrocarbon insecticide  $C_{12}H_8Cl_6O$

**di-elec-tric** \dɪ-'ēlek-'trɪk\ *n* [*dia-* + *electric*] (1837): a nonconductor of direct electric current — *dielectric* *adj*

**dielectric heating** *n* (1944): the rapid and uniform heating throughout a nonconducting material by means of a high-frequency electromagnetic field

**di-en-ceph-a-lon** \dɪ-'en-'sef-'ə-lən, dɪ-(ə)en-, -lən\ *n* [NL, fr. *dia-* + *encephalon*] (ca. 1883): the posterior subdivision of the forebrain — called also *betweenbrain*, *thalamencephalon* — *di-en-ce-phal-ic* \-'sə-'fal-ɪk\ *adj*

**di-ene** \dɪ-'ēn\ *n* [*di-* + *-ene*] (1917): a compound containing two double bonds between carbon atoms; esp: *DIOLEFIN*

**die-off** \dɪ-'ɔf\ *n* (1936): a sudden sharp decline of a population (as of rabbits) that is not caused directly by human activity (as hunting)

**die off** \('dɪ-'ɔf\ *vi* (1697): to die sequentially either singly or in numbers so that the total number is greatly diminished

**die out** *vi* (1853): to become extinct

**di-er-e-sis** *var of* *DIAERESIS*

**diesel** \dɪ-'zəl, -'səl\ *n* [Rudolf *Diesel*] (1894) 1: *DIESEL ENGINE* 2: a vehicle driven by a diesel engine

**diesel-electric** *adj* (1914): of, relating to, or employing the combination of a diesel engine driving an electric generator (a ~ locomotive)

**diesel engine** *n* (1894): an internal-combustion engine in which air is compressed to a temperature sufficiently high to ignite fuel injected into the cylinder where the combustion and expansion actuate a piston

BFC ... ABLE COPY

SYNTEX CORPORATION

HACKH'S  
**CHEMICAL  
DICTIONARY**

*[American and British Usage]*

*Containing the Words Generally Used in Chemistry,  
and Many of the Terms Used in the Related  
Sciences of Physics, Astrophysics, Mineralogy,  
Pharmacy, Agriculture, Biology,  
Medicine, Engineering, etc.*

*Based on Recent Chemical Literature*

FOURTH EDITION

Completely Revised and Edited by

**JULIUS GRANT**

M.SC., PH.D., F.R.I.C. CHEMICAL CONSULTANT

SYNTEX PATENT DEPT.

McGRAW-HILL BOOK COMPANY

New York St. Louis San Francisco Düsseldorf Johannesburg

Kuala Lumpur London Mexico Montreal New Delhi

Panama Rio de Janeiro Singapore Sydney Toronto

**BEST AVAILABLE COPY**



**dichlorophenamide.**  $C_6H_4O_2N_2Cl_2S_2 = 305.26$ . 4,5-Dichlorobenzene-1,3-disulfonamide. White crystals, m.240, insoluble in water; used to treat glaucoma (B.P.).

**dichlorophenarsine hydrochloride.**  $C_6H_3ClAsCl(NH_2)(OH) \cdot HCl = 290.41$ . Clorarsen, holarsol, phenarsen, 3-amino-4-hydroxyphenyldichloroarsine hydrochloride. White powder, soluble in water; an antisyphilitic.

**dichlorvos.** DDVP. Dimethyl-2,2-dichlorovinyl phosphate. Clear mobile liquid, d.1.43; an insecticide.

**dichroine.**  $C_{16}H_{21}O_3N_3(?)$ . An antimalarial alkaloid from the roots and leaves of *Dichroa febrifuga*, Lour., m.237, slightly soluble in water.

**dichroism.** (1) The property by which certain crystals exhibit different colors when viewed in different directions, or when viewed by reflected or refracted light. (2) The property of showing different colors when viewed through different thicknesses, e.g., certain indicator solutions.

**dichroite.** Iolite.

**dichromat.** A person having reduced color discrimination, and requiring a mixture of only two radiations when matching colors. Cf. *deuteranope*, *protanope*.

**dichromate.** (1) A salt containing the radical  $=Cr_2O_7$  (bichromate). (2) Sodium dichromate.

**dichromatic.** Having different colors according to the thickness of the layer through which the solution (e.g., dyestuffs) is viewed. Cf. *dichroism*.

**dichromic acid.** The hypothetical acid,  $H_2Cr_2O_7$  or  $2CrO_3 \cdot H_2O$ , from which dichromates are derived.

**dichroscope.** An instrument to determine the refractive power of crystals.

**dicinchonine.**  $C_{38}H_{44}O_2N_4 = 588.5$ . An alkaloid from cinchona bark.

**dick.** Ethyldichlorarsine.

**dickite.** A form of kaolin.

**Dick test.** An antitoxin test for scarlet fever (B.P.).

**dicodeine.**  $C_{72}H_{84}O_{12}N_4$ . A polymer of codeine.

**dicodide.**  $C_{18}H_{21}O_3N = 299.15$ . Dihydrocodeinone. A codeine derivative.

**diconchinine.** Diquinidine.

**diconic acid.**  $C_9H_{10}O_6 = 214.1$ . A citric acid derivative.

**dicophane.** Chlorophenothane.

**dicoumarin.** 3,3'-Methylenebis-4-hydroxycoumarin. The active agent responsible for sweet clover disease of cattle; an anticoagulant in the treatment of thrombosis and embolectomy.

**dicyan(o).** (1) Indicating a compound containing 2 cyano radicals. (2) Cyanogen. d. **acetylene.**  $CN \cdot C \cdot CN = 76.09$ . Colorless crystals, m.21.

d. **diamide.**  $NH_2 \cdot C(:NH) \cdot NHCN = 84.18$ . Cyanoguanidine, param. An isolog of guanylurea. Colorless scales, m.205, soluble in water. d. **diamidine.**  $NH_2 \cdot C(:NH) \cdot NH \cdot CONH_2 = 102.2$ . Guanylurea. The amide of guanidinecarboxylic acid. Colorless crystals, m.105, soluble in water. Cf. *Grossmann reagent*.

**dicyanide.** A salt containing 2 cyanide radicals.

**dicyanin(e).** An aniline-dye, infrared photosensitizer. d. A.  $C_{21}H_{27}N_2O_2I = 466.2$ . 1,1'-Diethyl-4,2'-dimethyl-6,6'-diethoxy-2,4'-carbocyanin iodide. A quinoline dye infrared photosensitizer. Cf. *cyanin* dyes.

**dicyanodiamide.** Dicyandiamide.

**dicyanogen.**  $CN-CN = 52.0$ . Oxalonitrile, ethane dinitrile. Colorless, poisonous gas, b. -25. Cf. *cyanogen*.

**dicyclic.** Describing a system of 2 fused rings; as, naphthalene, but not biphenyl.

**dicyclomine hydrochloride.**  $C_{19}H_{35}O_2N \cdot HCl = 346.05$ . White bitter crystals, m.173, soluble in water; an antispasmodic (B.P.).

**Didial.** Trademark for a combination of diallyl-barbituric acid and ethylmorphine.

**didiphenylamine-** Prefix indicating 2 diphenylamine radicals. d. **fluosilicate.**  $[(C_6H_5)_2NH]_2 \cdot H_2SiF_6 = 482.26$ . White crystals, m.169.

**didiphenylene ethylene.** Difluorene.

**didymia.** Didymium oxide.

**didymium.** Di. A supposed element discovered by Mosander (1841) in the earth didymia; it is a mixture of neodymium and praseodymium. "D. salts," by-products of the manufacture of gas mantles, are mixtures of neodymium and praseodymium salts; hence, the symbol Di below means Nd and Pr. d. **carbonate.**  $Di_2(CO_3)_6 \cdot 6H_2O$ . Pink powder, insoluble in water. d. **chloride.**  $Di_2Cl_6 \cdot 12H_2O$ . Purple crystals, soluble in water, a germicide. d. **nitrate.**  $Di_2(NO_3)_6 \cdot 12H_2O$ . Purple, asymmetric crystals, soluble in water; an antiseptic. d. **oxide.**  $Di_2O_3$ . Gray powder, insoluble in water. d. **salicylate.**  $Di_2(C_7H_5O_3)_6$ . Dymal. White powder; an antiseptic. d. **sulfate.**  $Di_2(SO_4)_3 \cdot 6H_2O$ . Red crystals, slightly soluble in water; a disinfectant.

**die casting.** Producing a shape by forcing a measured quantity of molten aluminum into a hardened alloy steel die (2-10 tons/in.<sup>2</sup>).

**dieldrin.**  $C_{12}H_8OCl_6 = 380.88$ . A chlorinated dimethanonaphthalene. White crystalline solid, m.175; an insecticide. Cf. *eldrin*.

**dielectric.** A nonconductor of electricity. d. **constant.**  $\epsilon$ . Permittivity. Inductivity. Specific capacitance:  $\epsilon = ee'/fr^2$ , where  $f$  is the force of repulsion between 2 point charges of electricity  $e$  and  $e'$ , which are at a distance  $r$  apart in a uniform medium. For practical purposes the relative permittivity is used; i.e., the ratio of the capacitance of a capacitor, when the dielectric is the substance under investigation, and air. d. **strength.** The potential (volts) at which an insulator breaks down, divided by the thickness (in 0.001 in.). Cf. *Clausius-Mosotti equation*, *Helmholtz equation*.

**dieline.** Dichloroethylene.

**Diel's hydrocarbon.**  $C_{18}H_{16}$ . The theoretical basis of the sterol molecule.

**Dien.** Trade name for a polyester synthetic fiber.

**diene.** Suffix indicating 2 double bonds. d. **series.** Diolefines.

**dienestrol.**  $C_{18}H_{18}O_2 = 266.34$ . 3,4-Bis(*p*-hydroxyphenyl)-2,4-hexadiene,  $OH \cdot Ph(C \cdot CHMe)_2PhOH$ . An estrogen (B.P.), m.233.

**dienol.** Catalytically dehydrated castor oil; a drying oil for paints.

**Diesel fuel.** Heavy fuel oil in which combustion is started by spontaneous ignition due to compression.

**diet.** The customary or prescribed food of an individual.

**dietary.** A systematic diet repeated at definite time intervals. d. **standard.** The amount of nourishment required per day by a man, corresponding with 3000 cal approximately, and varying according